

Conference Abstract

Introducing Nature 4.0: A sensor network for environmental monitoring in the Marburg Open Forest

Nicolas Friess[‡], Jörg Bendix[‡], Martin Brändle[‡], Roland Brandl[‡], Stephan Dahlke[‡], Nina Farwig[‡], Bernd Freisleben[‡], Hajo Holzmann[‡], Hanna Meyer[§], Thomas Müller[¶], Lars Opgenoorth[‡], Carina Peter[‡], Petra Quillfeldt[¶], Christoph Reudenbach[‡], Bernhard Seeger[‡], Ralf Steinmetz[#], Thomas Nauss[‡]

[‡] Philipps-Universität Marburg, Marburg, Germany

[§] Westfälische Wilhelms-Universität Münster, Münster, Germany

[¶] Biodiversity and Climate Research Centre (BiK-F), Senckenberg Gesellschaft für Naturforschung, Frankfurt (Main), Germany

[¶] Justus-Liebig-Universität Gießen, Gießen, Germany

[#] Multimedia Communications Lab (KOM), Technische Universität Darmstadt, Darmstadt, Germany

Corresponding author: Nicolas Friess (friess@staff.uni-marburg.de)

Received: 21 May 2019 | Published: 18 Jun 2019

Citation: Friess N, Bendix J, Brändle M, Brandl R, Dahlke S, Farwig N, Freisleben B, Holzmann H, Meyer H, Müller T, Opgenoorth L, Peter C, Quillfeldt P, Reudenbach C, Seeger B, Steinmetz R, Nauss T (2019) Introducing Nature 4.0: A sensor network for environmental monitoring in the Marburg Open Forest. Biodiversity Information Science and Standards 3: e36389. <https://doi.org/10.3897/biss.3.36389>

Abstract

Successful conservation strategies require frequent observations and assessments of the landscape. Although expert surveys provide a great level of detail, the trade-off is the limited spatial coverage and repetition with which they are executed. Remote sensing technology can partially resolve these issues; nevertheless, it still requires experts' experience to create conservation planning and reaction options. Nature 4.0 seeks to address these shortcomings by developing a prototype of a modular environmental monitoring system for high-resolution observation of species, habitats, and processes. The project combines expert surveys by nature conservationists, remote sensing, and a network of environmental sensors, which are integrated into stationary units as well as attached to unmanned aerial vehicles, rovers, or animals. By utilizing powerful data integration and analysis methods, Nature 4.0 will enable researchers to effectively observe

landscapes through a set of diverse lenses. Time series data from the project will also inform the development of early warning indicators. Following the open-source principle, as much of the project as possible will be made publicly available, including, for instance, schematics for sensor units, algorithms for data integration or information on species occurrence. In summary, Nature 4.0 will establish new methods and protocols in the field of comprehensive environmental monitoring by combining traditional sampling, remote sensing, and automated measurement stations. The prototype system is being developed in the Marburg Open Forest, an open research, education, and development platform for environmental monitoring methods. The Marburg Open Forest brings a cross-disciplinary group of scientists together with nature conservation experts from the private sector and the state government, as well as local schools and private citizens to collaborate and bridge the gap between basic and applied environmental research. After one year, we will present the results of the initial phase and share our experience with developing Nature 4.0.

Keywords

sensor networks, environmental monitoring, remote sensing, data integration, conservation biology

Presenting author

Nicolas Friess

Presented at

Biodiversity_Next 2019

Acknowledgements

The LOEWE priority program *Nature 4.0 | Sensing Biodiversity* is funded by the Hessian State Ministry for Higher Education, Research and the Arts, Germany.